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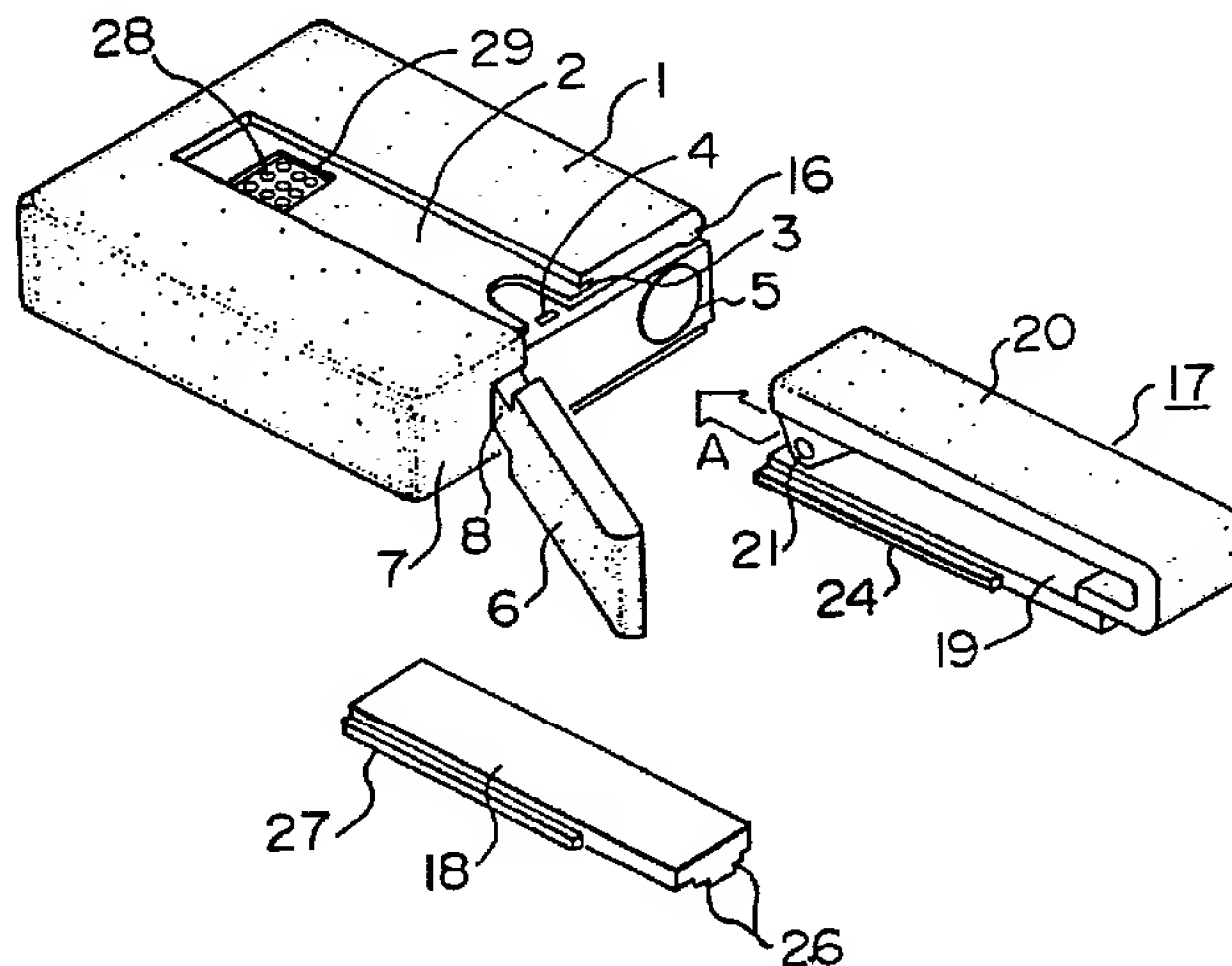
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(54) Belt clip for personal radio etc

(57) A portable radio equipment having a clip (17) and an exchange panel (18) which are adapted to be selectively fitted in a fitting groove (2) formed on the rear surface of a housing (1) incorporating a battery, a radio communication circuit, memory and the like, the clip (17) or the exchange panel (18) being releasably locked in the fitting groove (2), and having write-in terminals (28) connected to the memory and laid on the bottom part of the fitting groove (2), the write-in terminals (28) being shielded by the clip (17) or the exchange panel (18) fitted in the fitting groove (2).

FIG. 1



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FIG. 1

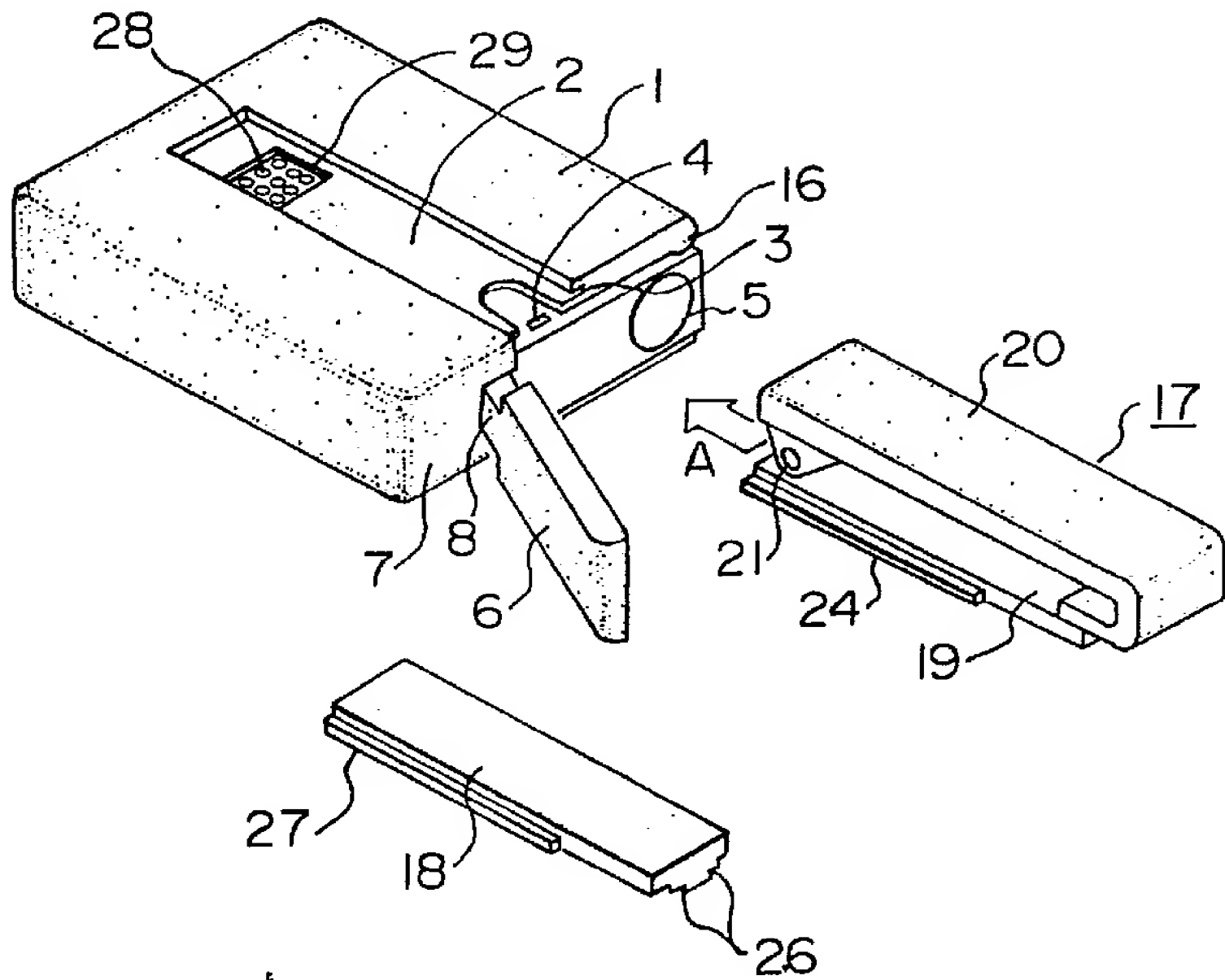


FIG. 2a

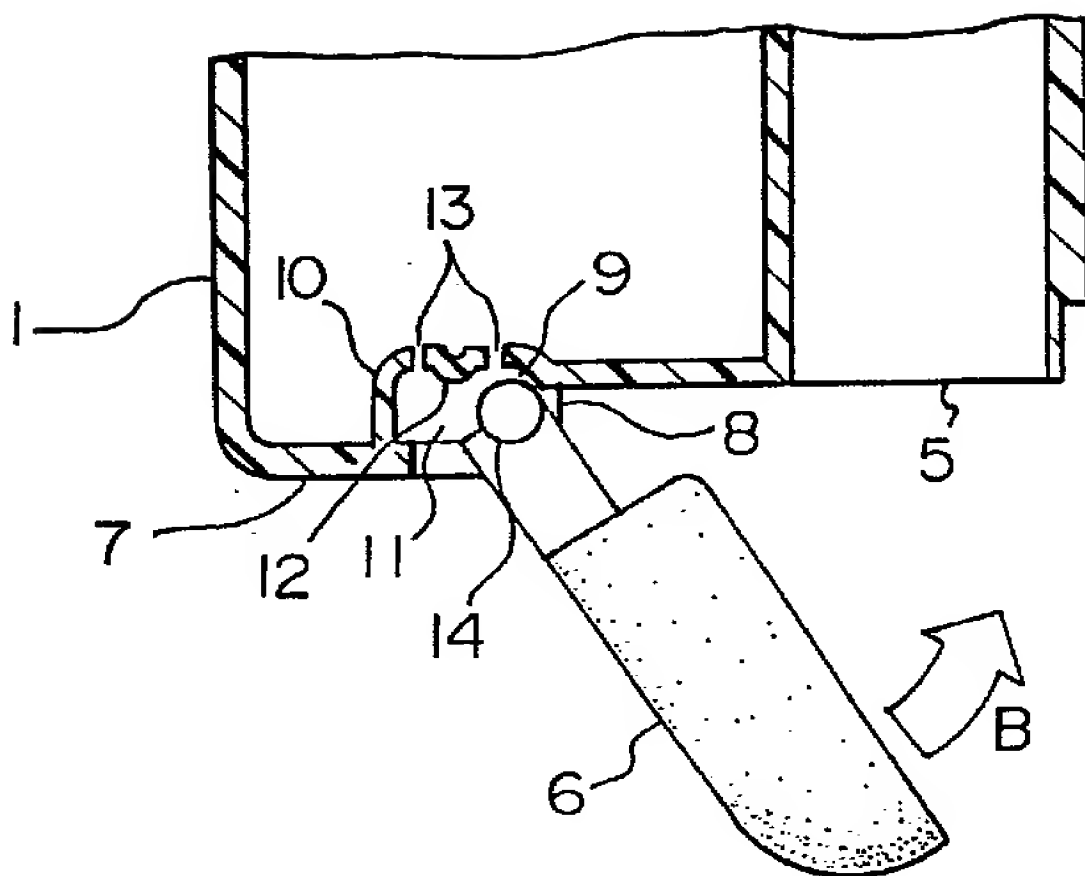


FIG. 2b

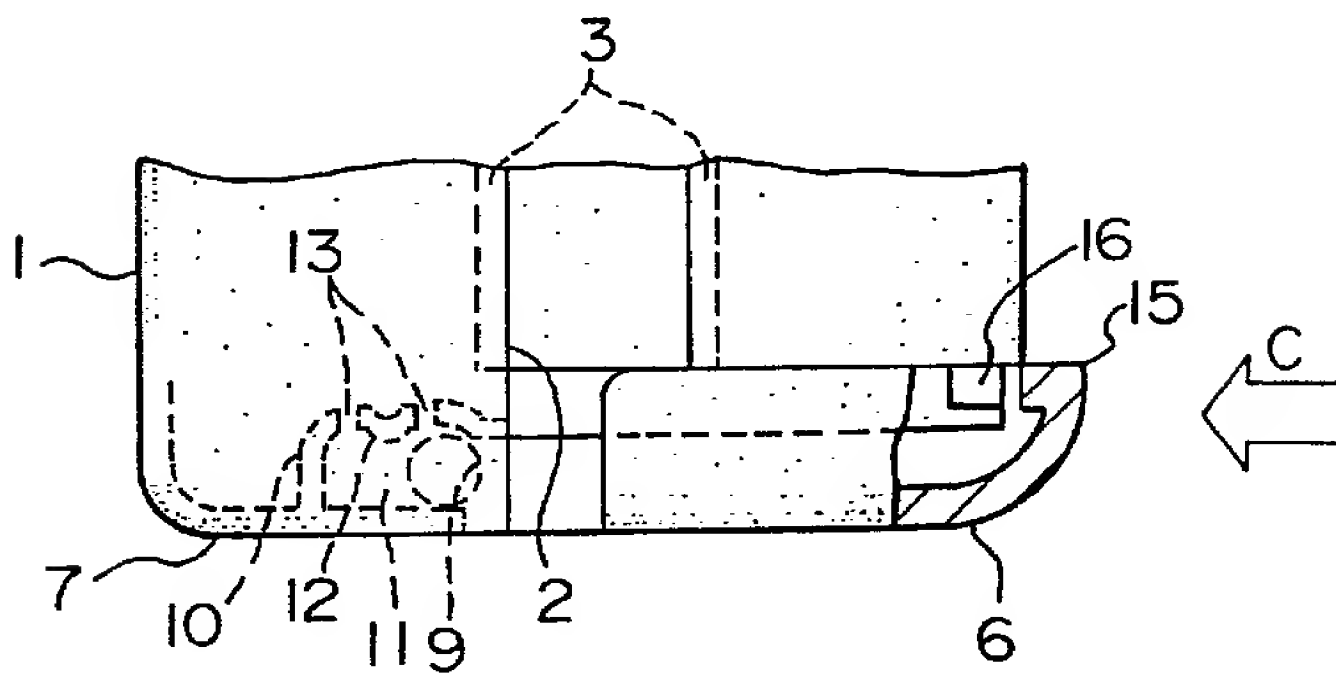


FIG. 3a

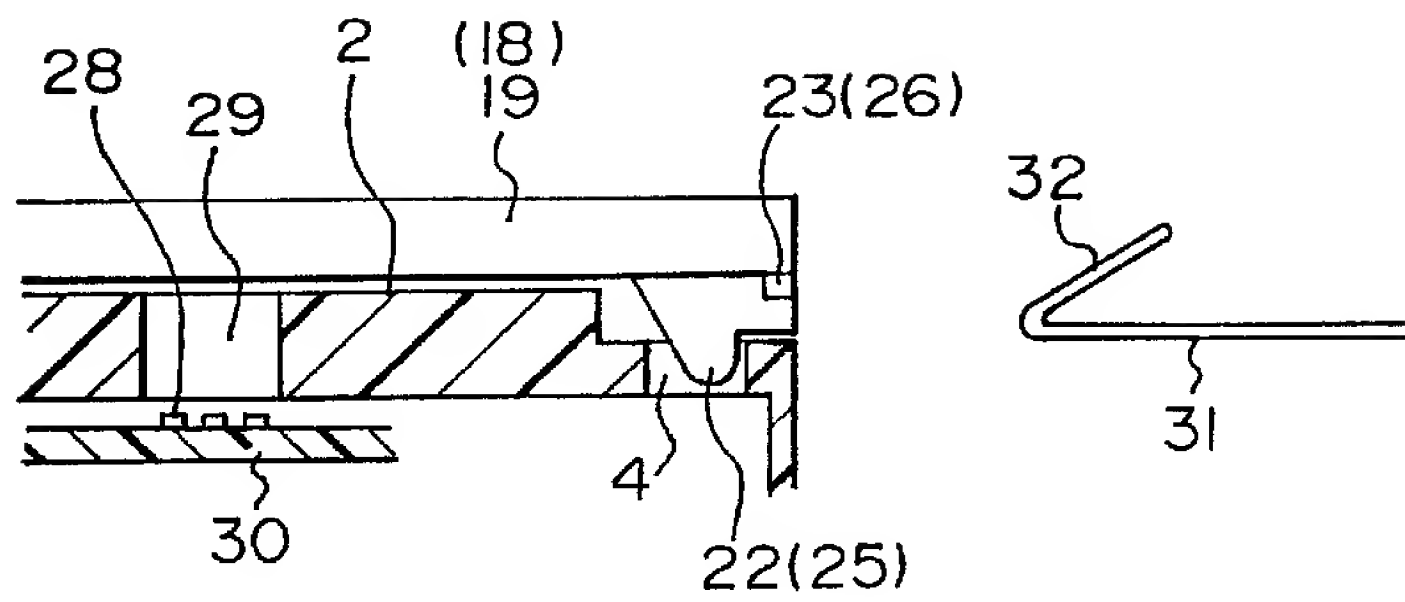


FIG. 3b

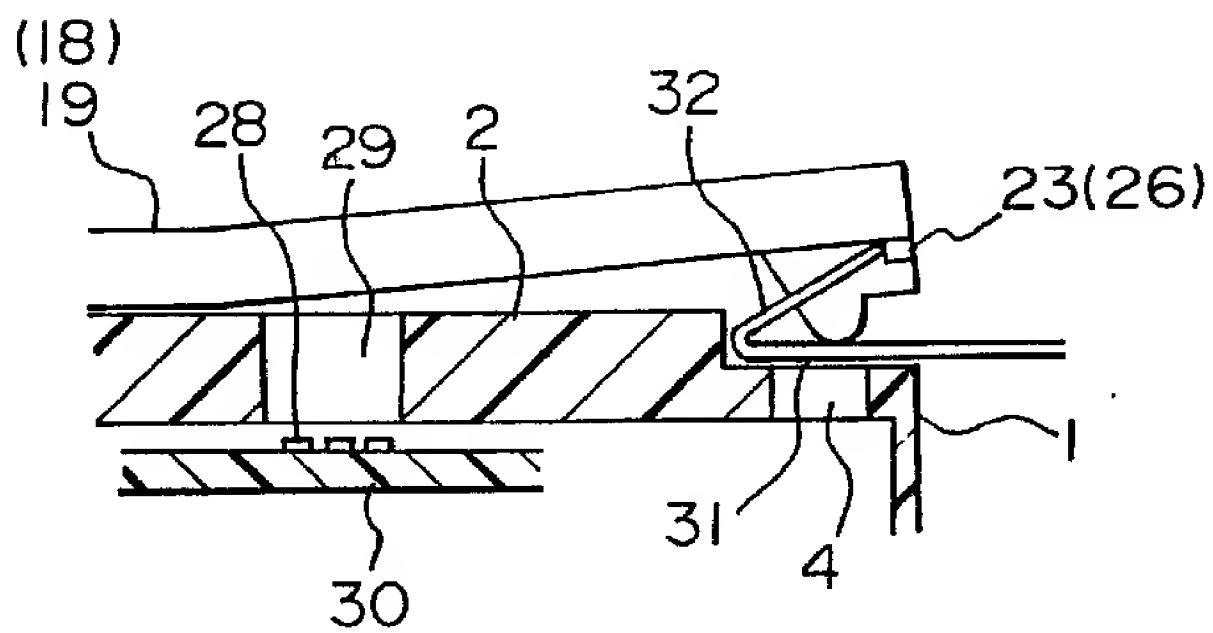


FIG. 4

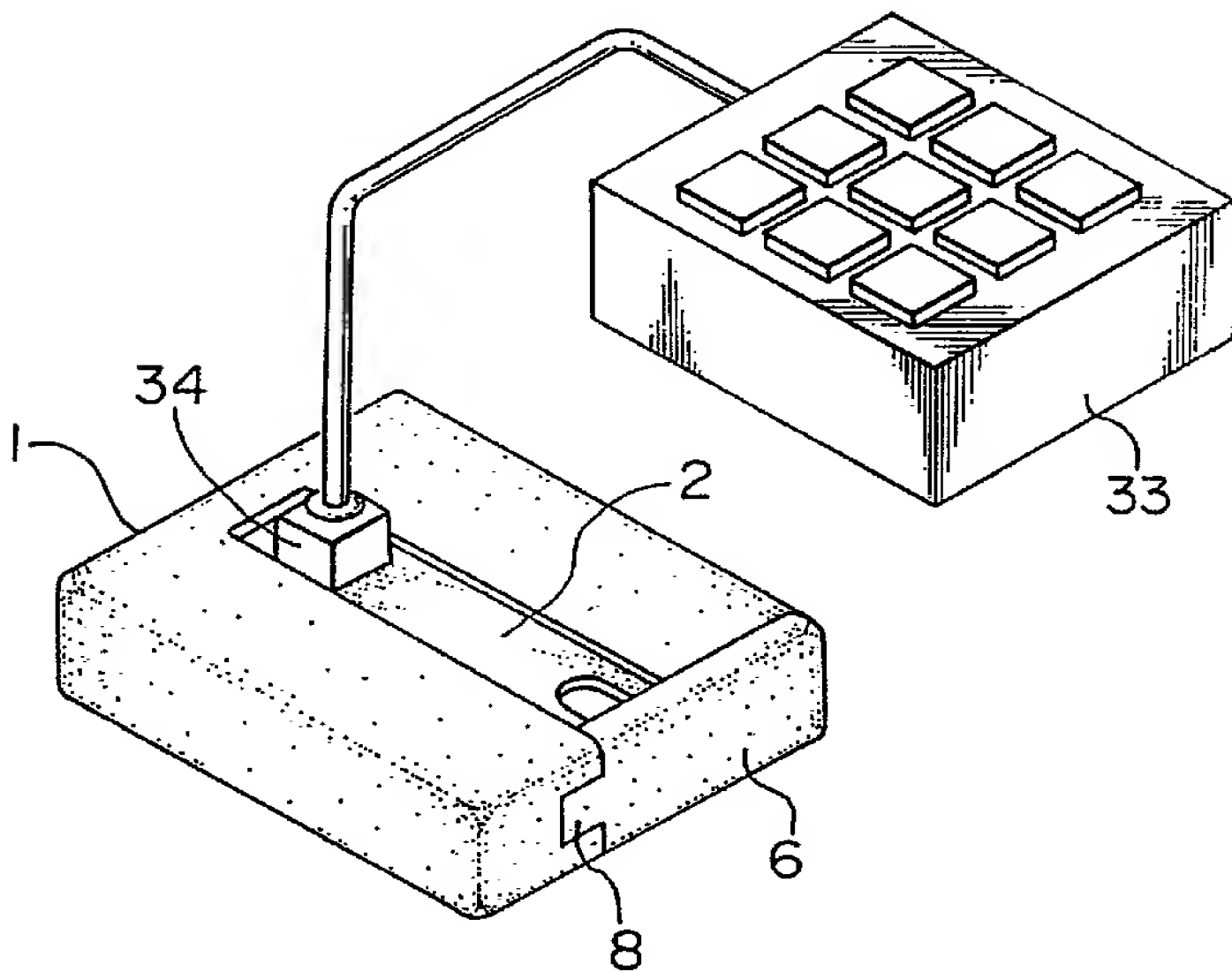


FIG. 5

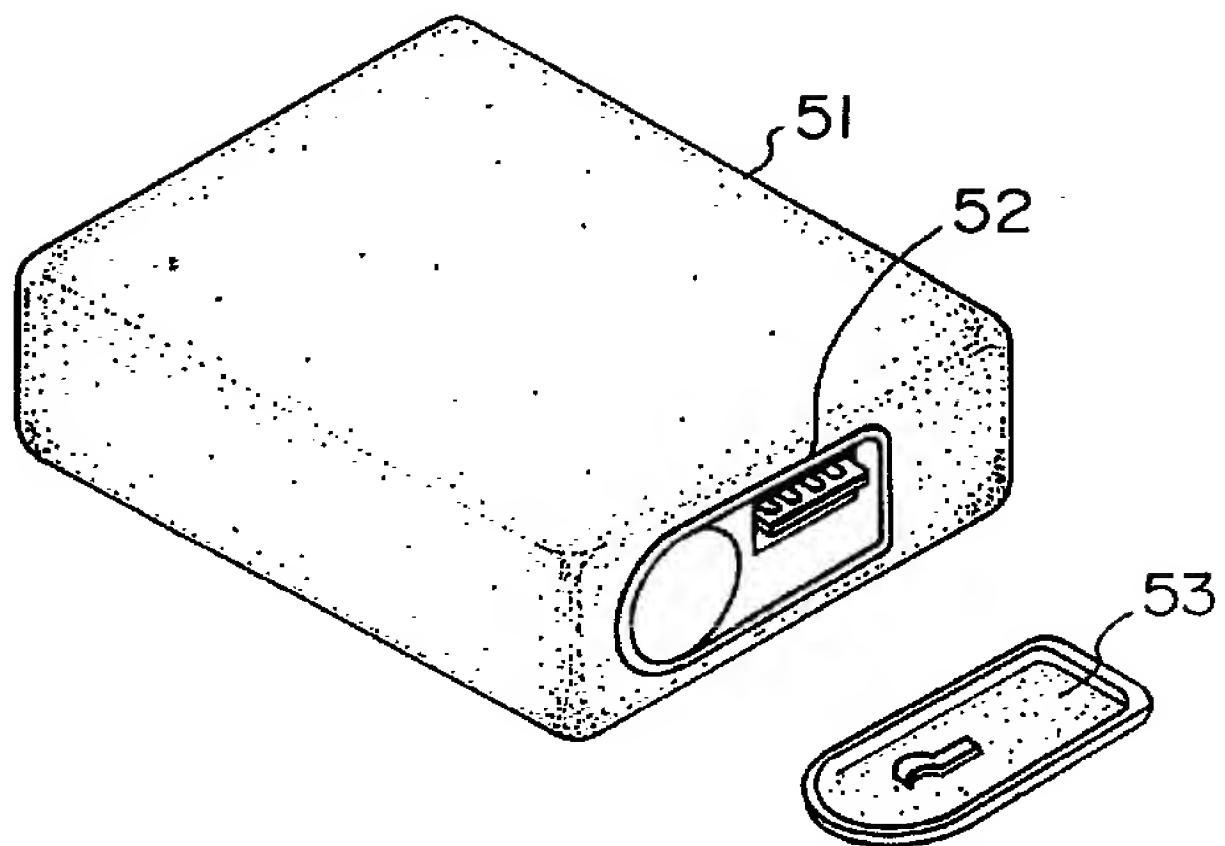


FIG. 6

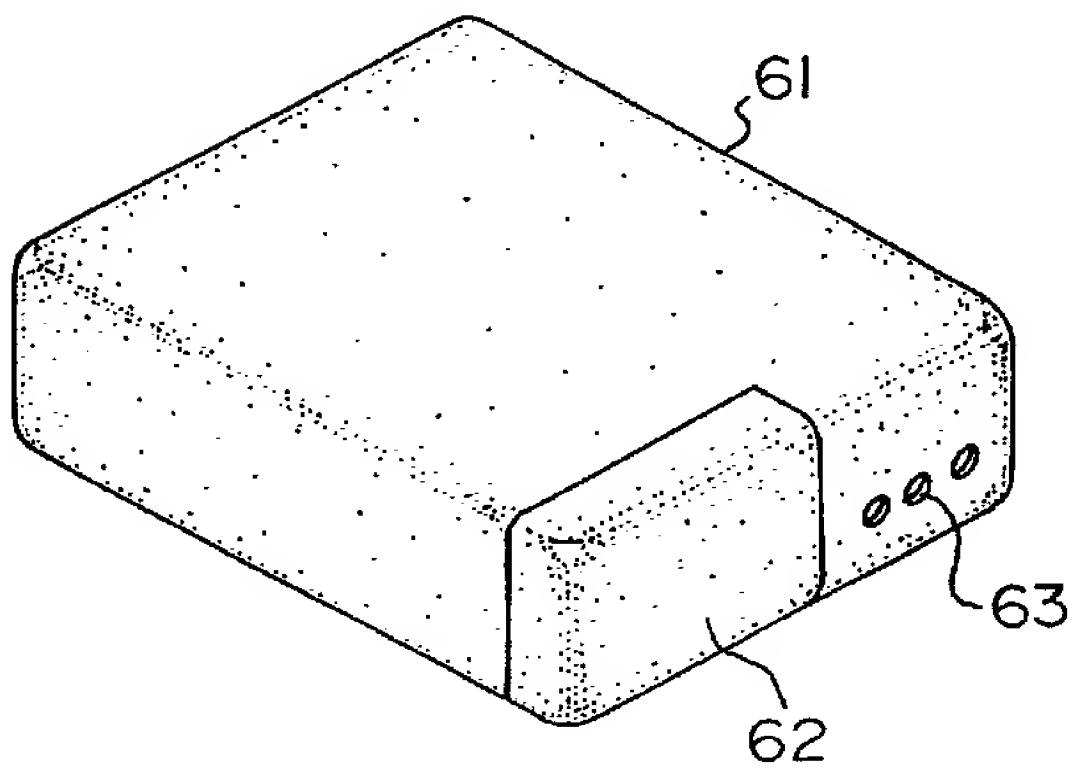


FIG. 7

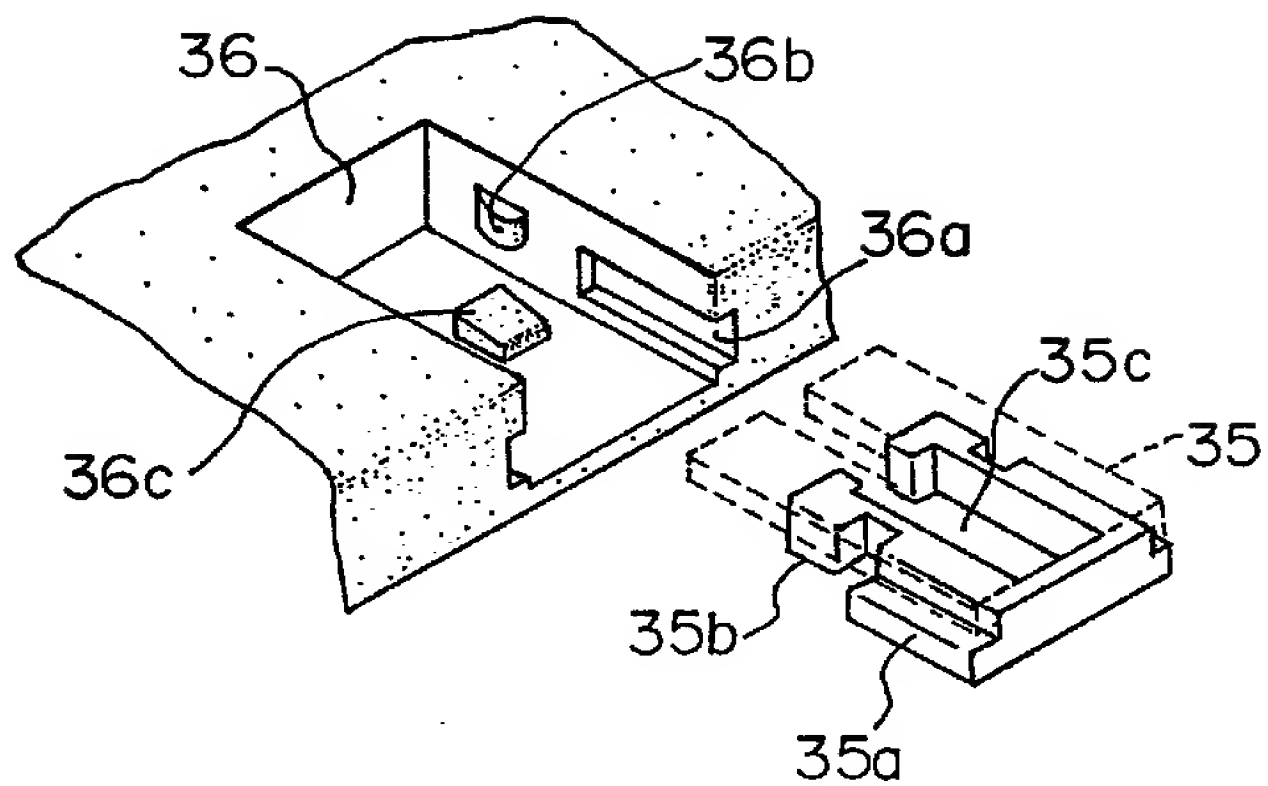


FIG. 8

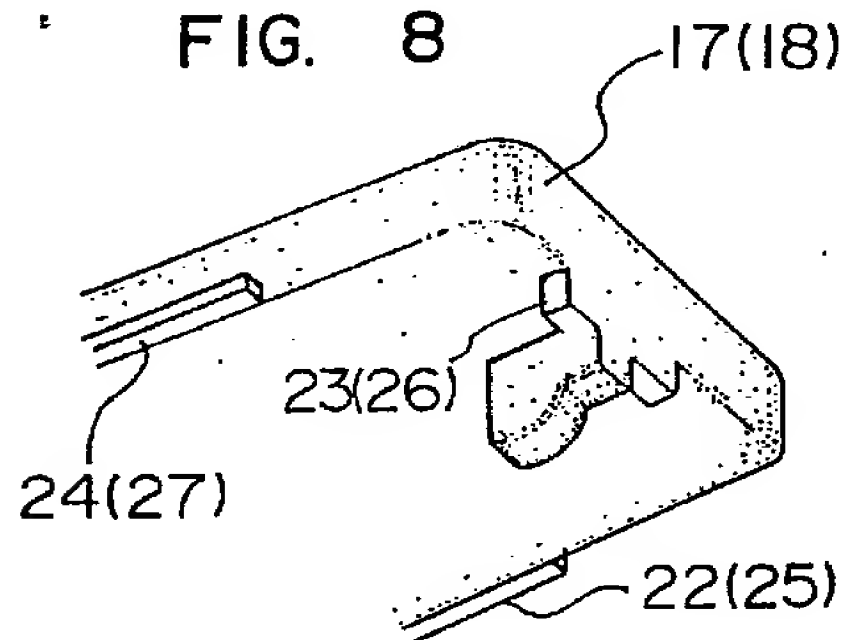


FIG. 9

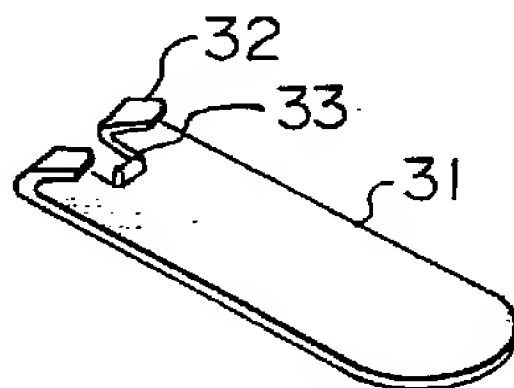


FIG. 10a

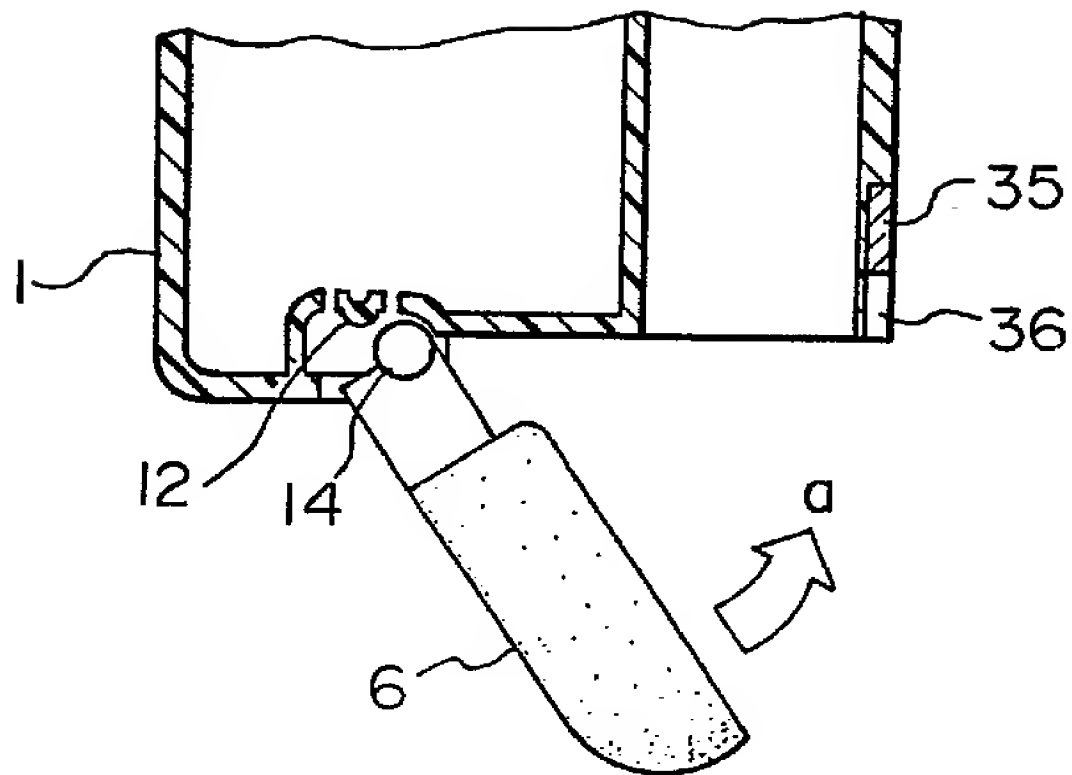


FIG. 10b

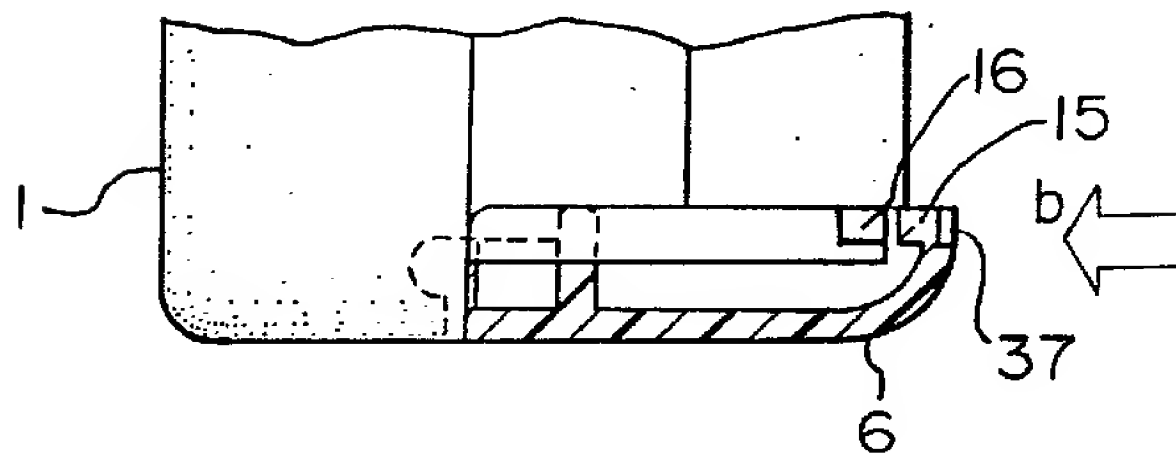
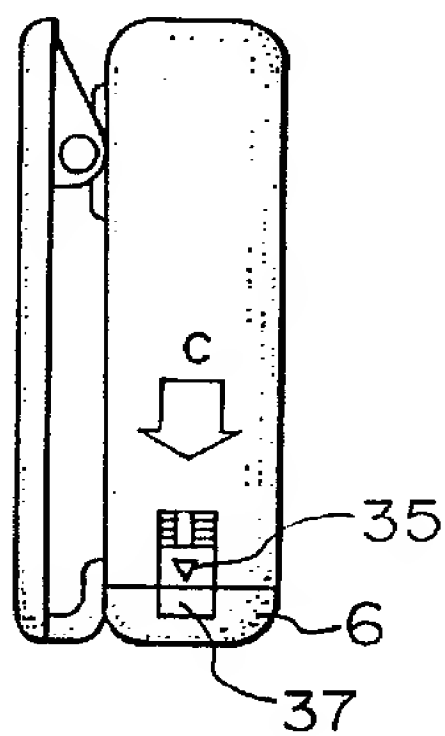


FIG. 10c





## 1 BACKGROUND OF THE INVENTION

The present invention relates to a miniature portable radio equipment.

## DESCRIPTION OF RELATED ART

5 A miniature portable radio equipment of a certain kind incorporates therein ROM in which ID code is written upon delivery or use. Further, there have been known many kinds of arrangements, that is, in the device as shown in Fig. 5, write-in terminals laid on  
10 the bottom part of a housing 51, are covered with a battery lid 53, and in an arrangement shown in Fig. 6, write-in terminals (which are not shown) are disposed inward of a hole 63 which is formed in the bottom part of a housing 61, adjacent to a battery lid 62. Further,  
15 there has been known a portable radio equipment having a clip (which is not shown) which is attached to the rear surface of a housing and which is adapted to hook on a belt and a pocket of clothes worn by a person so as to prevent a portable radio equipment from loosing or  
20 falling.

Such write-in terminals are important components of the radio equipment, and accordingly, has to be protected. However, in the above-mentioned conventional radio equipment, as shown in Fig. 5, the battery lid 53

1 is removed each time when a battery is replaced. Thus,  
the write-in terminals 52 are exposed to the exterior  
each time when the battery lid 53 is opened, and  
accordingly, it can be easily touched by a human finger  
5 or the like. Therefore, it is not preferable. Further,  
with the conventional arrangement shown in Fig. 6,  
since the write-in terminals are always exposed to the  
inside of the hole 63, they are possibly affected by the  
external circumstances, and therefore, it is unfavorable.  
10 Meanwhile, in order to carry the portable radio equip-  
ment, it is not only attached to a belt or a pocket of  
clothes with the use of the clip, but it is held in a  
handbag or a pocket without using the clip, particularly  
in such a case that the portable radio equipment is  
15 used by a woman. In the latter case, the clip is not  
only necessary but becomes hampering. Further, in  
order to enable the portable radio equipment to be used  
in both ways, that is, with and without the clip, two  
 housings with a clip and without a clip, should be  
20 prepared, it cause the cost thereof to rise up.

#### BRIEF SUMMARY OF THE INVENTION

The present invention is devised in view of  
the above-mentioned problem inherent to the conventional  
portable radio equipment, and accordingly, one object  
25 of the present invention is to provide a portable radio  
equipment which can protect write-in terminals from  
being touched by a human finger or against the external

1 environment, that is, it is possible to prevent useless  
writing.

The other object of the present invention is  
to provide a portable radio equipment which can be  
5 hooked on a belt or a pocket of clothes worn by a person  
with the use of a clip which can be removed when the  
portable radio equipment is held in a handbag or a  
pocket, thereby it is possible to aim at reducing the  
cost thereof.

10 Further, the other object of the present inven-  
tion is to provide a portable radio equipment which  
prevents the clip from being unexpectedly removed, that  
is, the clip can be surely locked onto the housing.

To the end, according to a first aspect of  
15 the present invention, there is provided a portable  
radio equipment comprising a housing in which an  
electronic circuit and a battery are disposed, a fitting  
groove formed in the housing; a clip and an exchange  
panel which are selectively fitted in the fitting groove,  
20 engaging means provided on both side edges of the clip  
and the exchange panel, for slidably engaging the clip  
and the exchange panel in the fitting groove; a locking  
means adapted to releasably lock the clip and the exchange  
panel in the fitting groove, and write-in terminals laid  
25 on the bottom part of the fitting groove.

According to a second aspect of the present  
invention, in addition to the first aspect of the present  
invention, locking projections for releasing the locking

1 means are formed on the rear surface of each of the clip and the exchange panel.

According to a third aspect of the present invention, in addition to the first and second aspects  
5 of the present invention, the clip and the exchange panel adapted to be selectively fitted in the fitting groove, are locked by a battery lid which is rotatably attached and releasably locked to the housing.

With this arrangement, according to the present  
10 invention, since the clip is fitted in the fitting groove in the housing by the engaging means and is locked therein by the locking means, the portable radio equipment can be held being hooked on a belt or a pocket of clothes worn by a person. Meanwhile, since the exchange panel  
15 can be fitted in the fitting groove, instead of the clip, and since it is locked in the fitting groove by the locking means, the portable radio equipment can be held in a handbag or a pocket without the clip which is hampering in this case. Further, since the write-in  
20 terminals are laid in the bottom part of the fitting groove, and since the clip or the exchange panel is locked in the fitting groove, the write-in terminals can be surely shielded.

Further, the clip and the exchange panel can  
25 be removed smoothly by use of a special unlocking tool which is inserted in a gap on the rear surface side of the clip or the exchange panel so as to release the locking means.

1           Further, since the clip or the exchange panel  
is fitted and locked in the fitting groove in the  
housing, and is further locked by the battery lid which  
is also locked to the housing, the clip and the exchange  
5 panel can be held in the housing with a high degree of  
reliability.

          These and other objects, and advantages as  
well as features of the present invention will be more  
apparent from the description of a preferred embodiment  
10 which will be hereinbelow explained with reference to  
the accompanying drawings, in which:

#### BRIEF DESCRIPTION OF THE DRAWINGS

          Fig. 1 is a perspective view illustrating a  
portable radio equipment in one embodiment form of the  
15 present invention;

          Fig. 2a and 2b are sectional views illustrating  
a battery lid section of the equipment shown in Fig. 1,  
among which Fig. 1a shows such a condition that the  
battery lid is opened, and Fig. 2b shows such a condition  
20 that the battery lid is closed.

          Figs. 3a and 3b sectional views illustrating  
a groove section shown in Fig. 1, among which Fig. 3a  
shows such a condition that a clip or an exchange panel  
is fitted in the groove while a releasing tool being  
25 not inserted, and Fig. 3b shows that the clip or the  
exchange panel is partly raised by the releasing tool  
inserted;

1           Fig. 4 is a perspective view illustrating  
the portable radio equipment in which the groove is  
opened and a ROM writer is connected to write-in terminals  
in the groove;

5           Fig. 5 is a perspective view illustrating a  
conventional portable radio equipment;

Fig. 6 is a perspective view illustrating  
another conventional radio equipment;

10          Fig. 7 is a perspective view illustrating a  
lid locking groove formed in a housing shown in Fig. 1  
and a latch plate whose main body or cover section is  
shown by the chain line;

Fig. 8 is a perspective view illustrating  
the essential part of the clip or the exchange panel;

15          Fig. 9 is a perspective view illustrating the  
releasing tool shown in Fig. 3a or 3b;

Figs. 10a and 10b are sectional views illus-  
trating the battery lid section of the housing, corre-  
sponding to Figs. 2a and 2b;

20          Fig. 10c is a side view illustrating the  
portable equipment with the clip being fitted thereon,  
in which the battery latch plate is clearly seen.

#### DESCRIPTION OF THE PREFERRED EMBODIMENT

25          Referring to Figs. 1 to 3, a fitting groove 2  
is formed in the center part of the rear surface of a  
housing 1, and is formed on its both longitudinal side  
walls with engaging grooves 3. The fitting groove 2 is

1 opened at one end part of the housing 1 so as to define  
an opening through which a clip 17 or an exchange panel  
18 which will be explained later can be introduced  
into the fitting groove 2. The bottom part of the fitting  
5 groove 2 is deeply cut so as to form a recess in the  
vicinity of the opening of the groove 2, and a locking  
hole 4 is formed on the bottom of the groove 2 within  
the recess. A battery lid 6 which is adapted to open  
and close a battery storage chamber 5 and the opening  
10 of the fitting groove 2 is attached to the one end part  
of the housing 1. More specifically, one side part of  
the one end part of the housing 1 is formed therein with  
a cutout 8 which defines therein a journal section having  
first and second journal parts 9, 10 which are opposed  
15 to each other through a space 11 within the journal  
section. The space 11 is narrower than the journal  
parts 11 since a partition projection wall 12 is  
formed therein. This partition projection wall 12  
is formed therein with slits 13 which give a resiliency  
20 so that the partition projection wall 12 can be resili-  
ently retracted. A shaft part 14 formed on the proximal  
end part of the battery lid 6 is rotatably supported  
by the first journal part 9 and can be displaced  
between the first and second journal parts 9, 10 by  
25 way of the space 11 while the partition projection  
wall 12 being forced to be retracted. An engaging  
protrusion 15 is formed at the inner side of the free  
end part of the battery lid 6, and an engaging cutout

1 16 is formed in the one end part of the housing 1 on the  
side remote from the cutout 8. Accordingly, when the  
battery lid 6 is pushed after being closed so that the  
shaft 4 is displaced from the journal part 9 to the  
5 journal part 10, the engaging protrusion 15 is fitted  
in the engaging cutout 16 so as to firmly lock the  
battery lid 6.

A clip 17 and an exchange panel 18 can be  
selectively fitted in the above-mentioned fitting groove  
10 2. The clip 17 has a clip member 20 having a hook-like  
part at its distal end and rotatably journalled at its  
proximal end to one short side part of a base plate 19  
by means of a shaft 21, and the distal end part of the  
clip member 20 is urged against the base plate 19 by a  
15 coil spring (which is not shown) and is therefore made  
into close contact with the latter. Accordingly, the  
clip member 20 can be rotated about the shaft 21, over-  
coming the resilient force of the coil spring so as to  
be displaced away from the base plate 19. A locking  
20 projection 22 is formed integrally with the rear surface  
of the base plate 19 at a position corresponding to that  
of the locking hole 4, in the distal end part of the  
clip member 20. Further, low height releasing protrusions  
23 are formed integrally with the rear surface of the  
25 base plate 19 on both sides of the locking projection  
22. The base plate 19 has engaging ridges 24 adapted  
to be engaged in the engaging grooves 3, and integrally  
formed on both long side faces of the base plate 19.



1 These engaging ridges 24 are cut intermediately so that  
they do not reach positions rear the locking projection  
22. It is noted here that the dimensions of the ridges  
and the grooves 3 are so selected that the locking  
5 projection 22 side part of the base plate 19 can be  
elastically deformed so as to be curved with the ridges  
24 being engaged in the grooves 3 (Refer to Fig. 3b).  
The exchange panel 18 is also adapted to be fitted in  
the fitting groove 2, being flush substantially with the  
10 rear surface of the base plate 19, and is integrally  
formed thereon with a locking projection 25 and releas-  
ing protrusions 26 similar respectively to the locking  
projections 22 and the releasing protrusions 23, on one  
short side part thereof. Further, engaging ridges 27  
15 similar to the engaging ridges 24 of the clip 17 are  
also formed integrally with the long side faces of the  
exchange panel 18.

Further, write-in terminals 28 through which  
ID codes are written in ROM is laid on the bottom part  
20 of the fitting groove 2. That is, the write-in terminals  
formed on a print circuit board 30 are disposed in a  
hole 29 formed in the bottom part of the grove 2 so that  
they are exposed to the outside through the hole 29.

The locking projection 22 or 25 of the clip  
25 17 or the exchange panel 18 are released from the locking  
hole 4 in the housing 1 by use of a releasing tool 31  
which is clearly shown in Fig. 9, having engaging  
protrusions 32 at its front end part, made of resilient

1 materials and bent in a V-like shape.

Referring to Figs. 3a and 3b together with Figs. 8 and 9, explanation will be made of the use mode of the portable radio equipment.

5 In the case of use of the portable radio equipment attached on a belt or a pocket of clothes worn by the user, after the battery lid 6 being opened, the engaging ridges 24 of the base plate 19 are fitted in the engaging grooves 3 through the opening of the fitting  
10 groove 2, and is then slid along the grooves 3 in the direction of the arrow A until the clip 17 is fully fitted in the fitting groove 2. Since the ridges 24 are not completely extended to positions near to the locking projection 22, the locking projection 22 can  
15 override the end part of the housing 1 due to an elastic deformation of the base plate 19 on the projection 22 side thereof. That is, as clearly shown in Fig. 3a, the projection 22 is adapted to be engaged into the locking hole 4. With this arrangement, the base plate  
20 19 of the clip 17 fitted in the fitting groove 2 can be locked so that the write-in terminals can be covered or shielded. Thereafter, as shown in Fig. 2a, the battery lid 6 is turned in the direction of the arrow B about the shaft 14 supported on the first journal part  
25 9, and is then pushed in the direction of the arrow C as shown in Fig. 2b. On the way of this placement through the space 11 from the first journal part 9 to the second journal part 10, a click feeling can be given

1 by the partition projection wall 12, and is then supported  
by the second journal part 10. Meanwhile, the engaging  
protrusion 15 is engaged and locked in the engaging  
cutout 16. The locked battery lid 6 abuts against the  
5 end face of the distal end part of the clip member 20  
on the base plate 19 of the clip 17 so as to limit the  
displacement of the clip 17, and accordingly, the clip  
17 is surely locked. Accordingly, the portable radio  
equipment can be attached to the belt or the pocket by  
10 means of the clip member 20.

Meanwhile, in the case of the portable radio  
equipment being held in a handbag, a pocket of clothes  
or the like, at first the battery lid 6 is pulled in  
the direction reverse to the direction of the arrow C,  
15 and then the shaft 14 supported by the second journal  
part 10 is shifted through the space 11 to the first  
journal part 9 while deforming the partition projection  
wall 12 and is then held thereby. Accordingly, the  
engaging protrusion 15 is disengaged from the engaging  
20 cutout 16 so that the battery lid 6 is released. Then,  
the battery lid 6 is turned about the shaft 14 in the  
direction reverse to the direction of the arrow B as  
shown in Figs. 1 or Fig. 2a. Further, when the forward  
end part of the releasing tool 31 is inserted between  
25 the bottom part of the opening of the fitting groove 2  
and the releasing protrusions 23 by use of a resilient  
deformation of the engaging projection 23, the locking  
protrusion 22 side of the base plate 19 of the clip 17

1 is elastically deformed and curved due to the repulsive  
resiliency of the locking parts 32. Accordingly, the  
locking projection 22 is disengaged from the locking  
hole 4, that is, the clip 17 is released. In this  
5 condition, since the front end parts of the locking parts  
32 are engaged with the inside of the releasing protrusions 23, if the releasing tool 31 is pulled out, the  
engaging ridges 24 of the clip 17 are slid along the  
engaging grooves 3 in the housing 1, and accordingly,  
10 the clip 17 is removed from the fitting groove 12.  
Then, the exchange panel 18 is fitted in the fitting  
groove 2, similar to the installation of the clip 7.  
More specifically, the engaging ridges 27 of the exchange  
panel 18 are inserted in the engaging grooves 3 in the  
15 housing 1 through the opening of the fitting groove 12,  
and then the engaging ridges are slid along the engaging  
grooves 3 in the housing 1 until the exchange panel 18  
is fully fitted in the fitting groove 12. Since the  
engaging ridges do not reach positions near to the  
20 locking protrusion 25, the locking protrusion 25 can  
override the end part of the housing 1 and then engages  
into the locking hole 4 as shown in Fig. 3a. Accordingly,  
the exchange panel 8 can be fitted and locked in the  
fitting groove 2, and further, the write-in terminals  
25 can be shielded. Thereafter, the battery lid 6 is turned  
in the direction of the arrow B as shown in Fig. 2a,  
and is then shifted in the direction of the arrow C in  
order to be locked. Thus, the exchange panel 8 can be

1 surely locked, as mentioned above. Accordingly, the clip 7 which becomes obstructive when the portable radio equipment is stored in a handbag or a pocket can be removed.

5           The removal of the exchange panel 18 from the housing 1 can be made, similar to that of the clip 17, and accordingly, the explanation thereof is omitted.

          Further, in order to write ID codes in the ROM, as shown in Fig. 4, the clip 17 or the exchange  
10 panel 18 is removed from the fitting groove 2 in the housing 1 so as to expose the write-in terminals 28 to the outside through the hole 29, and the write-in terminals 28 are connected thereto with contact terminals 34 connected with a writing device 33 which is then manipu-  
15 lated so as to write the ID codes into the ROM.

          Since the clip 7 or the exchange panel 18 can be held in the fitting groove 12 in the housing 1 under locking condition when the battery lid 6 is opened so as to replace batteries, there is no risk of missing  
20 of the clip 7 or the exchange panel 18. Further, since the clip 7 or the exchange panel 18 can be removed only by use of the special releasing tool 31, it is difficult for third party to remove the clip 7 or the exchange panel 18.

25           Although the embodiment of the present invention has been detailed, the present invention should not be limited to this embodiment, but can be changed or modified therefrom within the spirit and the scope

1 of the invention which can be only limited by the  
appended claims.

For example, the engaging grooves 3 can be  
formed in the base plate 19 of the clip 17 or the exchange  
5 panel 8 while the engaging ridges 24, 27 can be formed  
on the side walls of the fitting groove 2 in the housing  
1.

Further, in order to further ensure the locking  
of the clip 17 or the exchange panel 18 in the fitting  
10 groove 2 in the housing 1, it is preferable to use a  
battery lid locking mechanism as shown in Figs. 10a to  
10c. That is, a latch plate 35 is slidably fitted in  
a shallow groove 36 formed in the side surface of the  
housing 1 on the side where the distal end face of the  
15 battery lid 6 is positioned when the latter is closed.  
Further, the distal end face of the lid is formed  
therein with a shallow groove 37 which is aligned with  
the shallow groove 36 when the lid 6 is closed.

When the lid 6 is closed, the latch plate 35  
20 is shifted toward the distal end part of the lid 6  
so as to be extended between both grooves 36, 37, and  
accordingly, the lid 6 is firmly locked. Accordingly,  
this can, in turn, firmly lock the clip 17 or the  
exchange panel 18 fitted in the fitting groove 12.

25 The latch plate 35 and the shallow groove 36  
are clearly shown in Fig. 7. Engaging ridges 35a formed  
on both side surfaces of the base of the latch plate 35  
are engaged slidably in engaging grooves 36a formed in

- 1 the side walls of the shallow groove 36. When the latch plate 35 is fitted in the shallow groove 36, a cutout 35c formed in the base 35b of the latch plate 35 receives a raised part 36c formed on the bottom surface
- 5 of the shallow groove 36 while recessed parts formed in both side surfaces of the base being fitted onto protrusions 36b formed on the side walls of the shallow groove 36. With this arrangement, the latch plate 35 can be prevented from coming off.

WHAT IS CLAIMED IS:

1. A portable radio equipment comprising:

a housing incorporating therein an radio communication circuit, memory, a battery and the like and having a rear surface, a front end face and a side face;

a fitting groove formed in said rear surface of said housing so as to be opened at the front surface of said housing and having side walls and a bottom part;

a battery lid rotatably mounted on the front end face of said housing, for closing an opening of a battery space in said housing;

a clip and an exchange panel which are adapted to be selectively fitted in said fitting groove, having both side faces;

engaging means formed on said both side faces of each of said clip and said exchange panel and on said side walls of said fitting groove, for slidably engaging said clip or said exchange panel in said fitting groove;

locking means provided on each of said clip and said locking plate and on said housing, for releasably locking said clip or said exchange panel in said fitting groove; and

write-in terminals connected said memory and laid in the bottom part of said fitting groove.

2. A portable radio equipment as set forth in claim 1, wherein at least one of releasing protrusions



for releasing said locking means is formed on each of said clip and said exchange panel.

3. A portable radio equipment as set forth in claim 1 wherein said clip or said exchange panel which is selectively fitted in said fitting groove is further locked by said battery lid when the latter is closed.